



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
08/994,038	12/18/1997	SHUNPEI YAMAZAKI	07977/208001	6059
26171	7590	01/06/2004	EXAMINER	
FISH & RICHARDSON P.C. 1425 K STREET, N.W. 11TH FLOOR WASHINGTON, DC 20005-3500			COLEMAN, WILLIAM D	
			ART UNIT	PAPER NUMBER
			2823	

DATE MAILED: 01/06/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

### Application No.

08/994,038

### Applicant(s)

YAMAZAKI ET AL.

### Examiner

W. David Coleman

### Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 14 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 2,6,11,12,14 and 16-26 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 2,6,11,12,14 and 16-26 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_ 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 2, 6, 12, 14, 16, 18, 19, 22, 23, 24, 25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Inoue et al., U.S. Patent 5,873,003 in view of Okada et al., U.S. Patent 5,582,640.
3. Pertaining to claim 2, Inoue discloses a semiconductor device substantially as claimed. See **FIGS. 1-50**, where Inoue teaches a semiconductor device comprising:

a plurality of photodiodes **403** (as seen in FIG. 22) being formed in a matrix on an insulating surface **1609**;

a plurality of vertical charge coupled devices on the insulating surface, said vertical charge coupled devices being connected with the plurality of photodiodes; (see FIG. 16);

at least a horizontal charge coupled device on the insulating surface, said horizontal charge coupled device being connected with the vertical charge coupled devices, wherein at least one of the vertical and horizontal charge coupled devices comprises a crystalline semiconductor film having a plurality of crystals extending in a crystal growth direction,

wherein a crystal structure of the crystalline semiconductor film **1753** in the crystal growth direction is continuous so that a charge moving is not restricted by a grain boundary.

However, Inoue fails to explicitly teach wherein at least one of the vertical and horizontal charge coupled devices that has the crystalline semiconductor film is arranged such that a charge transfer direction of the at least one of the vertical and horizontal charge coupled devices is coincident with the crystal growth direction. Okada teaches that the crystalline semiconductor film is arranged such that a charge transfer direction of the at least one of the vertical and horizontal charge coupled devices is coincident with the crystal growth direction. See FIGS. 1-158(h) where Okada teaches horizontally crystallization, also see FIG. 50(d) where Okada teaches the growth direction of the silicon grain. In view of Okada, it would have been obvious to the crystalline semiconductor film is arranged such that a charge transfer direction of the at least one of the vertical and horizontal charge coupled devices is coincident with the crystal growth direction, because the mobility between the presence and absence of the grain boundary becomes more remarkable (column 62, lines 34-56).

4. Pertaining to claim 23, Inoue discloses further an active matrix display device. Okada teaches a semiconductor device to be an active matrix display device. In view of Okada, it would have been obvious to one of ordinary skill in the art to incorporate the active matrix display device of Okada into the Inoue device because a high quality picture is reproduced (column 1, lines 25-27).

5. Pertaining to claim 11, Inoue discloses wherein the crystalline semiconductor film 2 is formed over a quartz substrate, and wherein an incident light is made from a side of the quartz substrate (see claim 12 of Inoue).

6. Pertaining to claim 12, Inoue discloses wherein the charge transfer direction includes a plurality of directions (polycrystalline film option).

Art Unit: 2823

7. Pertaining to claim 14, Inoue discloses wherein the semiconductor film is a silicon film.

Pertaining to claims 17 and 20, Inoue discloses wherein the crystalline semiconductor film is formed over a quartz substrate.

8. Pertaining to claims 16 and 19, Inoue discloses a semiconductor device comprising:

a crystalline semiconductor film being formed on an insulating surface,

said crystalline semiconductor film having a plurality of crystals extending in a crystal growth direction (polycrystalline) which is parallel to the insulating surface;

an insulating film on the crystalline semiconductor film;

a plurality of electrodes being formed on the insulating film, each of said plurality of electrodes being located within a predetermined distance so that a plurality of MOS capacitors 11 formed between the plurality of electrodes and the crystalline semiconductor film with the insulating film therebetween,

wherein a charge transferred from one of the MOS capacitors to another of the MOS capacitors in a charge transfer direction,

wherein a crystal structure of the crystalline semiconductor film is continuous so that the crystal structure is regarded as single crystal for the charge,

wherein the charge transfer direction is coincident with said crystal growth direction.

9. Pertaining to claim 18, Inoue discloses wherein the semiconductor device consist of an image sensor.

10. Pertaining to claims 21 and 22, Inoue discloses an image sensor (CCD), which consist of a photodiode.

11. Pertaining to claims 25 and 26, Inoue discloses a semiconductor device comprising:

a photoelectric conversion (silicon interacting with light) formed over an insulating surface;

a charge coupled device electrically connected to the photoelectric conversion device and formed over the insulating surface;

said charge coupled device including:

a crystalline semiconductor film formed on the insulating surface, said crystalline semiconductor film having a plurality of crystals (polycrystalline silicon as taught by Inoue) extending in a crystal growth direction which is parallel to the insulating surface;

an insulating film on the crystalline semiconductor film (MOSFET section);

a plurality of electrodes (having a predetermined distance, which becomes an active matrix display) formed on the insulating film (Inoue teaches forming an array, column 6, lines 8-11) so that a plurality of MOS capacitors are formed between the plurality of electrodes and the crystalline semiconductor film with the insulating film therebetween,

wherein a charge is transferred from one of the MOS capacitors to another of the MOS capacitors in a charge transfer direction,

wherein the charge transfer direction is coincident with the crystal growth direction.

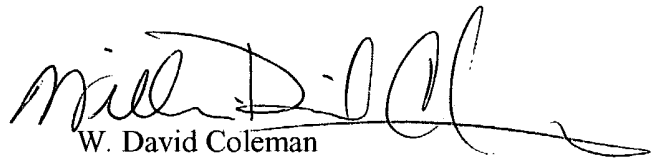
### ***Conclusion***

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to W. David Coleman whose telephone number is 703-305-0004. The examiner can normally be reached on 9:00 AM-5:00 PM. After February 4, 2004, please call 571-272-1856

Art Unit: 2823

13. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone number for the organization where this application or proceeding is assigned is 703-308-7722.

14. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

A handwritten signature in black ink, appearing to read 'W. David Coleman', with a long horizontal flourish extending to the right.

W. David Coleman  
Primary Examiner  
Art Unit 2823

WDC